

# Gangrene of the hand and forearm after inadvertent intra-arterial injection of pyrazole

## A case report

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### Summary

A case of gangrene of the hand following inadvertent intra-arterial injection of a pyrazole derivative (Tomanol) is presented. Gangrene of the hand and superficial sloughing of the distal arm necessitated a forearm amputation. Because of the serious sequelae, precautions must be taken to avoid inadvertent intra-arterial injections and due consideration must be given to the anatomical variations of the brachial artery and its branches in the cubital fossa.

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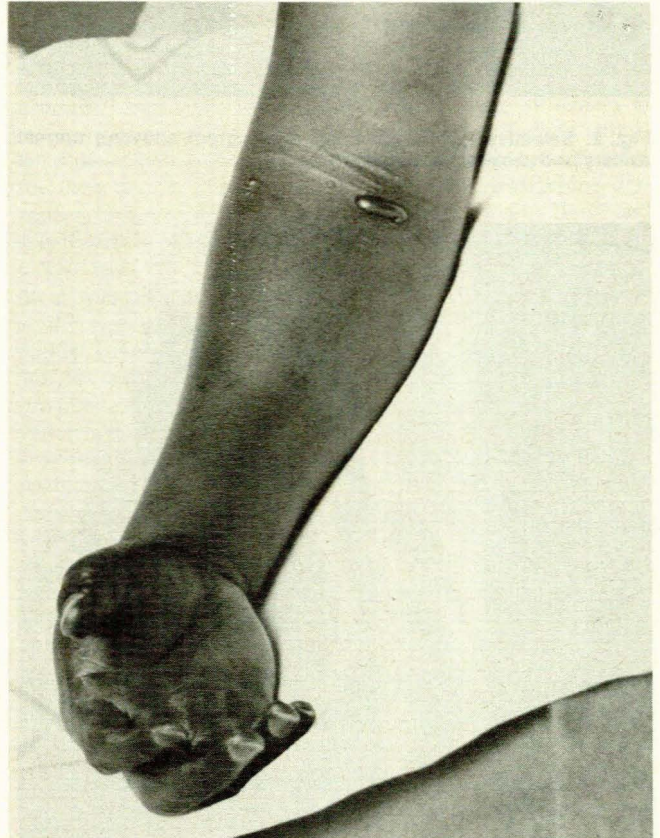
The inadvertent intra-arterial injection of solutions meant for intravenous use results in arterial injury, a situation which is being recognized with increasing frequency.<sup>1-8</sup> In recent years, many reports describing one or several cases of intra-arterial injection of various drugs have underlined the disastrous effects. The intra-arterial administration of irritant substances is not confined to anaesthetic practice and most of the recent cases have resulted from self-injection by drug addicts.<sup>3,6</sup>

The results of, presumably inadvertent, intra-arterial injection of a pyrazole derivative (Tomanol) into the brachial artery are described.

### Case report

A 23-year-old black man was given a parenteral injection of Tomanol (isopyrine-phenylbutazone) for what he described as 'flu'. The anti-inflammatory agent was slowly administered into a vessel in the right cubital fossa. Immediately after completion of the injection the patient complained of severe pain in the hand and forearm associated with paraesthesiae and paralysis. On admission to hospital some hours later his right hand displayed a typical claw-like deformity with fingers in flexion and a grossly swollen forearm suggestive of brachial artery occlusion (Fig. 1).

The patient had no previous history of arterial or venous disease. The blood pressure was 120/70 mmHg, the pulse rate 82/min, and the cardiovascular and respiratory systems were



**Fig. 1. Swollen right forearm and clawlike deformity of right hand hours after intra-arterial injection of isopyrine-phenylbutazone.**

normal. Examination of the contralateral cubital fossa revealed that the brachial artery and its branches were superficial instead of deep to the venous system. The haemoglobin concentration was 14 g/dl and the platelet count and clotting profile were normal. The fasting blood glucose level was 5,6 mmol/l. Segmental pressure studies revealed no recordable blood pressure in the hand or the radial, ulnar or distal brachial arteries. A selective right subclavian arteriogram (Figs 2 and 3) confirmed that the brachial artery was totally occluded distal to the profunda brachii artery.

The rapid onset of irreversible arterial insufficiency and gangrene of the hand and distal forearm within days of the injection necessitated amputation after an upper and forearm fasciotomy had been performed. Supportive treatment before amputation consisted of appropriate analgesia, antibiotics, intravenous dexamethasone, and elevation and immobilization of the involved arm. Low-molecular-weight dextran (Rheomacrodex 500 ml daily) was administered immediately after admission until amputation of the arm was indicated. A stellate

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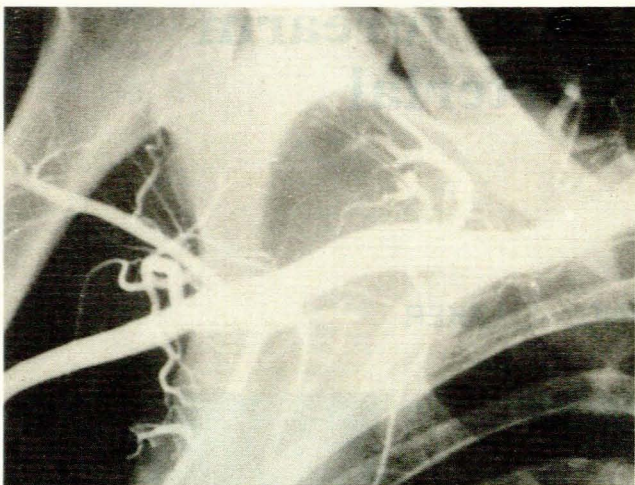


Fig. 2. Selective right subclavian arteriogram showing normal axillary and proximal brachial artery.

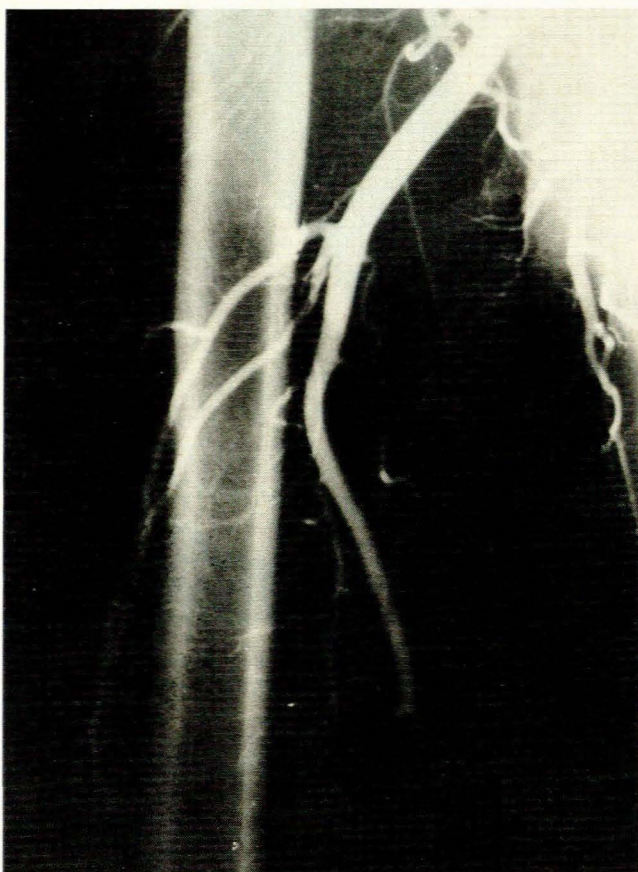


Fig. 3. Selective right subclavian arteriogram showing occlusion of the brachial artery distal to the origin of the profunda brachii artery.

ganglion block, total heparinization or intra-arterial vasodilators were not considered necessary.

## Discussion

This case illustrates that inadvertent intra-arterial injection of medications may cause irreversible damage to an extremity.

Intra-arterial injections have occurred in anaesthetized patients (usually secobarbital and thiopentone) and conscious patients, many of whom have been drug addicts.<sup>3</sup>

The main symptom in the conscious patient after an intra-arterial injection is immediate, severe burning pain in the hand and forearm distal to the site of injection.<sup>4,6</sup> In severe cases a purplish discoloration is noted in the fingertips, and the fingers become cold and flexed. The intensity of the pain and the subsequent series of events are variable, depending upon the quantity of the drug administered as well as its pharmacological side-effects.

Although much experimental work has been done, the pathogenesis of ischaemia and gangrene following intra-arterial administration of medications is not fully understood.<sup>1,2</sup> The theoretical mechanisms include chemical endarteritis, crystal micro-embolization, release of noradrenaline resulting in arterial spasm, intravascular thrombosis, the harmful nature of the injected material, and particulate embolization of intra-arterially injected drugs.<sup>6</sup>

Treatment of the complications following intra-arterial injection of drugs has been disappointing and tissue loss occurs all too frequently regardless of the type of therapy undertaken. The specific management and duration of treatment are controversial and therapy must be individualized.<sup>4</sup> A variety of measures has been recommended which include surgical intervention, thrombectomy, repeated brachial plexus or stellate ganglion block, anticoagulation with heparin, local infiltration with procaine or lignocaine to counteract irritation and spasm, administration of dexamethasone, aspirin, dipyridamole and intravenous dextran-70, and fasciotomy to relieve compartment syndrome in severe cases.<sup>4,6</sup> Supportive measures including adequate analgesia, active and passive physiotherapy with elevation of the affected limb are important.<sup>6</sup> Amputation is not uncommon following irreversible damage to the limb.

Prevention of intra-arterial injections is of paramount importance.<sup>4</sup> Anaesthetists have commented on the presence of aberrant or superficial arteries of the cubital fossa, forearm, wrist and hand. Gaspar<sup>6</sup> reported that in 10-13% of patients the brachial artery bifurcates above the elbow joint, in which case both the ulnar and radial artery may be superficial to the fascia of the forearm muscles and may be more vulnerable to needle puncture. Additional preventive measures include avoiding hyperextension of the elbow, palpation to detect the aberrant distribution of arteries, using veins on the lateral side of the antecubital fossa and ensuring adequate lighting before venepuncture.<sup>4,6</sup>

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